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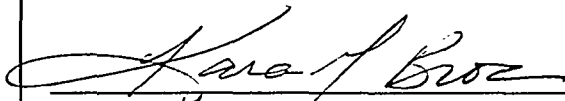
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7. Abstract

The Automated Bar Coding of Air Samples at Hanford (ABCASH) system provides an integrated data collection, sample tracking, and data reporting system for radioactive particulate air filter samples. The ABCASH plotting program provides a graphical trend report for ABCASH of the performance of air sample results. This document provides an operational guide for using the program.

Based on sample location identifier and date range, a trend chart of the available data is generated. The trend chart shows radiological activity versus time. General indications of directional trend of the concentrations in air over time may be discerned. Comparison limit set point values are also shown as derived from the ABCASH data base.

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## **ABCASH Plotting Program**

# **Users Guide**

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**MASTER**

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## 1.0 Introduction

The Automated Bar Coding of Air Samples at Hanford (ABCASH) system provides an integrated data collection, sample tracking, and data reporting system for radioactive particulate air filter samples. The ABCASH plotting program provides a graphical trend report for ABCASH of the performance of air sample results. The following descriptions provide an operational guide for using the program.

Based on sample location identifier and date range, a trend chart of the available data is generated. The trend chart shows radiological activity versus time. General indications of directional trend of the concentrations in air over time may be discerned. Comparison limit set point values are also shown.

## 2.0 General Operations

Operation of the program is dependent on expected data formats. An input data file is created with other utilities such as the data retrieval features of the ABCASH data base. Alternative data sources may be used which provide the expected data in the required format. A typical system flow chart is shown in Appendix A. The utilities gather sample point identification, desired date ranges, sample results within date range, and various other minor parameters. These are stored in a fixed format disk file for access by the plotting program. The data file format is shown in Appendix B.

Once the input data file is ready, the plotting program is started. The normal startup and processing messages are shown in Figure 1. The 'Processing...' message shown in Figure 1. is progressively generated to indicate proper operation.

Plot generation with a standard ABCASH workstation (Appendix C) takes about 2 minutes per frame on screen and 3 minutes per frame to a direct attached Hewlett Packard compatible laser printer. Actual times may vary depending on system load and number of data points.

The program is made to run as a normal IBM-PC DOS executable program on any compatible system with 384 kilobytes of available memory. User selectable screen or hardcopy plotting is supported for a limited number of devices. See device configuration section below and recommendations in Appendix C.

An example chart is shown in Figure 2.

## 3.0 Configuration

The air sample plotting program uses a configuration file to determine output device characteristics. The program must generate different control commands depending on the target device such as the user console display or an attached



```
C:\>plot

      Westinghouse Hanford Co.
      ABCASH Plotting Program
      Revision 1.20

Processing sample point: S289 Alpha.....Printing to S289_A.hpg
                          Beta.....Printing to S289_B.hpg

Processing sample point: B651 Alpha.....Printing
                          Beta.....Printing

End of Program.

C:\>
```

Figure 1 Example Normal Hardcopy Operation

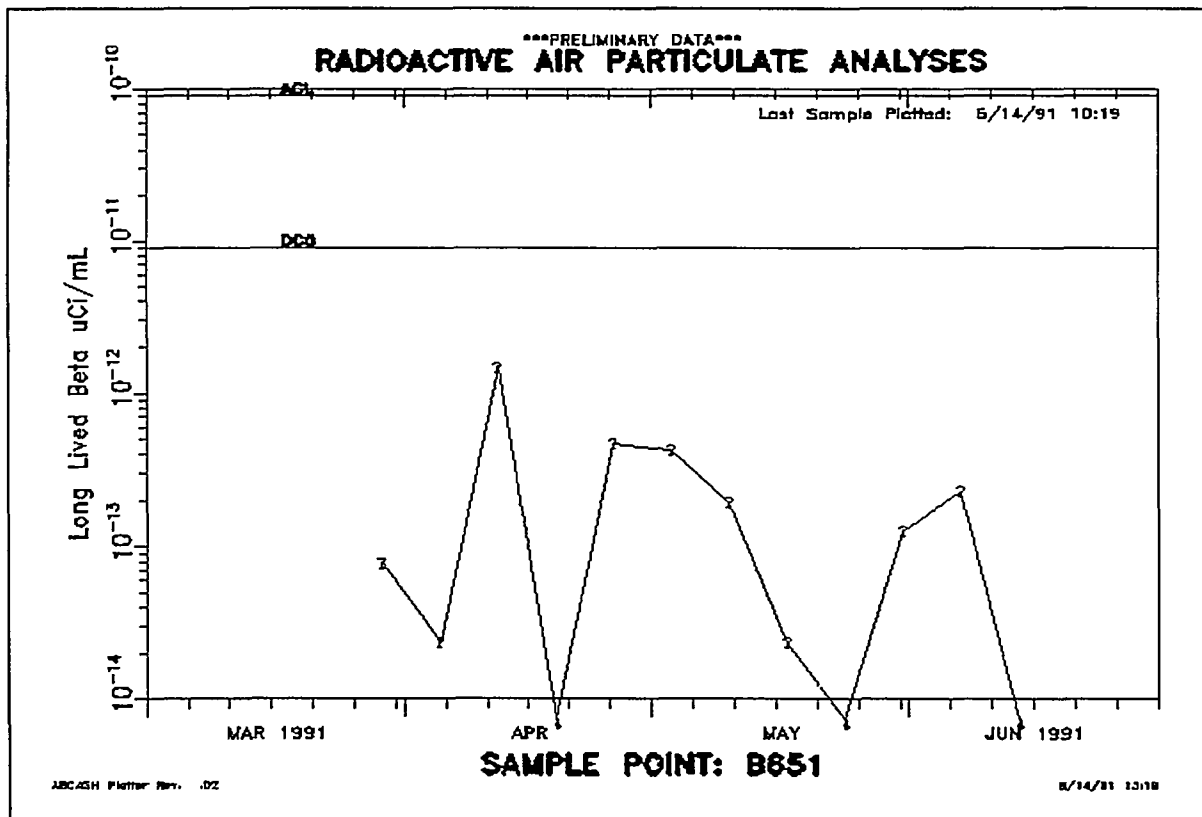


Figure 2 Example Chart

hardcopy printer. A user menu sequence is presented which causes the configuration file to be created when it is not present. This normally occurs

only the first time the program is operated on a workstation or a default environment.

An internal option (Appendix B.) provides an HPGL compatible disk file. File naming convention is LLLL\_Z.hpg, where LLLL is the sample location identifier and Z represents the (A)lpha or (B)eta chart. This option provides a method of porting the charts to other applications which can convert the HPGL format.

New equipment additions or changes require re-configuration. This is accomplished by deleting the file 'AIRPLOT.CFG' and re-running the program. An example of the contents of 'AIRPLOT.CFG' is shown in figure 3.

```

1.30 Revision
  F l_diag
  F l_chng_dev
  T l_histogram
Display/Hardcopy/HPGL
  3          0          0 idef
  97         1          11 ioport
  97         62         20 model
  8.65      8.50      8.65 base x window
  6.15      6.00      6.15 base y window
  .00       .00       .00 base x offset
  .00       .00       .00 base y offset
  .00       .00       .00 rotation angle
  1.00      1.00      1.00 base x origen
  1.00      1.00      1.00 base y origen
    
```

Figure 3 Example of 'AIRPLOT.CFG'.

The configuration menus are shown in figures 4 through 8. Each requires the user to select an option by entering a valid option number.

3.1 Display selection. The workstation displayed graphs are either black and white or with limited color enhancement dependent on display type. Two basic types are supported, Extended Graphics Adapter (VGA) and the Color Graphics Adapter (CGA). The Virtual Graphics Array (VGA) is also supported in 16 color EGA mode. New ABCASH workstations will have VGA. Older compatible workstations may have CGA or EGA. If unsure, contact the End User Computing center for assistance. Selecting CGA/EGA (black and white) for a VGA system will work but the display will not be full sized. The opposite situation is unpredictable and may cause a blank screen or system halt. Select the compatible option from the menu shown in Figure 4.

3.2 Hardcopy Selection. Several general plotting hardcopy devices are supported, ranging from dot matrix Epson printers, through Hewlett-Packard pen plotters to LaserJet printers. The standard ABCASH workstation includes a LaserJet printer and should be selected. The LaserJet device provides the

```
C:\>plot

                Westinghouse Hanford Co.
                ABCASH Plotting Program
                Revision 1.30

                ABCASH Plotter Setup...Revision 1.30

                Plotting Device Definition
                Selection      Definition.....
                1)             V/EGA 16 Color (640x480)
                2)             CGA/EGA 2 Color (640x200)

                What is screen type selection?
```

Figure 4 Selection of Display Device

best plot quality. Users of systems with sufficient computing memory but lacking a LaserJet may select the lower resolution dot matrix option. Use of a LaserJet on the Hanford Local Area Network (HLAN) is effective but slow. Select the compatible option from the menu shown in Figure 5.

```
                Plotting Device Definition
                Selection      Definition.....
                3)             HP LaserJet Printer
                4)             HP 7475 Pen Plotter
                5)             HP 7550A Pen Plotter
                6)             Epson 9 pin, 8" carriage
                7)             Epson 24 pin, 8" carriage

                What is hardcopy model selection?
```

Figure 5 Selection of Hardcopy Device

3.3 Hardcopy Port. The hardware port with a cable to the hardcopy device must be defined. For workstations on HLAN, the system configuration may include a port assigned to a shared printer or plotter. The user must determine the proper device port and select it from the menu. In the case of 'COM' type ports, the user must have set up the communications parameters prior to use. Select the compatible option from the menu shown in Figure 6.

```

Output Port Definitions
Selection      Definition.....
3)            LPT1
4)            LPT2
5)            LPT3
6)            Disk File Output
7)            COM1 9600,n,8,1
8)            COM2 9600,n,8,1

What is hardcopy port selection? 3
    
```

Figure 6 Selection of Hardcopy Output Port

3.4 Metafile Processing. Creation of physical charts contains an internal two step process. The first operation translates data into plotting lines recorded into a temporary 'metafile'. Except for screen display, actual physical plotting is a final translation of the metafile into device specific commands. Options for using, keeping, and deleting the metafile are provided. Select the desired option from the menu shown in Figure 7. Note: saving the metafiles will rapidly consume large quantities of disk space, approximately 300,000 bytes per chart, and in general is of little use.

```

Hardcopy metafile processing: 0) Normal plotting
                               1) Plot and save metafile
                               2) Create metafile only

What is metafile process type?
    
```

Figure 7 Selection of Plotter Metafile Process Type

3.5 Diagnostics. The plotting program can be made to record primary data and parameters to a diagnostics file. The file 'PLTDIAG.SC' may be displayed or printed as an ASCII text file. The creation is controlled through the option shown in Figure 8. This option should be turned off for normal use. Select the desired option from the menu shown in Figure 8.

```

Diagnostics to PLTDIAG.SC enabled.
Enable diagnostics to file PLTDIAG.SC (Y/[N])?
    
```

Figure 8 Selection of Diagnostics Capture Mode

3.6 Histogram Plot Style. The plotting program provides an option for trend chart style. The normal or default mode is a traditional point-to-point or dot joined graph. The data appear in a sawtooth fashion, implying ramping changes in concentration from point to point.

A second style is available which displays the data as a joined histogram. Vertical lines show sample value changes and horizontal or top lines imply length of sample at the average concentration for the period. This method of display also can indicate errors in sampling due to time gaps or record errors showing sampling overlaps. The user may wish to try both methods. Select the desired option from the menu shown in Figure 9. Note that switching modes will require redefining the configuration file as noted in 3.0, AIRPLT.CFG.

```
Histogram style plot disabled.  
Enable histogram type plot mode (Y/[N])?
```

Figure 9 Selecton of Plot Style.

#### 4.0 Installation

The program, AIRPLOT.EXE, may be copied to any DOS directory accessible as a default or via the path list. The configuration file, AIRPLOT.CFG, is automatically generated in the working directory from user prompted input the first time the program is executed. The configuration file will remain on the default directory. A test system would consist of a default subdirectory containing a copy of the program, configuration file, and an input data file.

#### 5.0 Program Operation

Input to the program is expected in the form of an ASCII formatted file as defined in Appendix B. The prepared file may be passed to the plotting program in two ways: default or included in the execution command. The default file name is AIRPLOT.DT. An example of this file is shown in Figure 10.

The program is started using the following command at the DOS prompt:

```
AIRPLOT [filename] 
```

If [filename] is not supplied, the program attempts to use the default data file AIRPLOT.DT.

Record	Contents.....									
1	W104	11	0	5	2	0				
2	1	592	31692							
3	2.020e-012	1.000e-009	DAC							
4	2.000e-014	3.000e-011	DCG							
5										
6	1	592	1089	288.45		.538E-13		.854E-13		
7	11192	1034	164.25			-.319E-14		.297E-13		
8	11292	919	166.55			.102E-12		.124E-12		
9	11992	1051	169.33			.192E-14		.340E-13		
10	12692	1106	168.67			.106E-12		.192E-12		
11	2	292	1127	167.70		.247E-13		.835E-13		
12	21692	919	167.50			.251E-12		.374E-12		
13	22392	1034	168.83			.444E-14		.707E-13		
14	3	292	922	166.92		.116E-14		.171E-13		
15	3	992	995	168.92		.102E-12		.306E-12		
16	31692	922	166.92			.432E-12		.486E-12		

Figure 10 Example Input Data File

Appendix A: System Data Flow Diagram

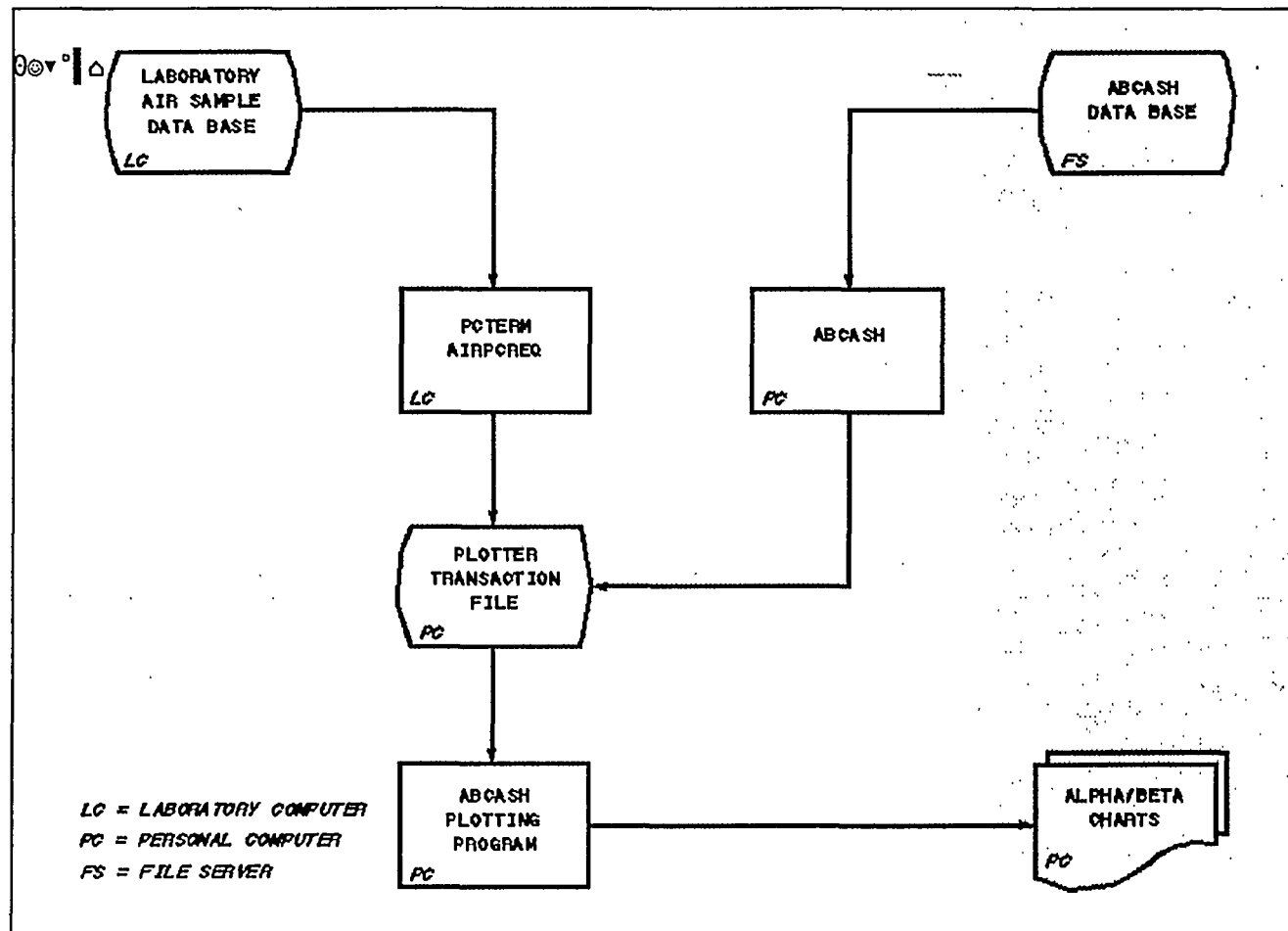


Figure 11 System Data Flow

Appendix B: Program Data File Structure

Sample Header Data				
Record	Element	Size (bytes)	Type	Definition
Sample Point Identification				
1	1	4	char.	Location Code (characters left justified, blank filled)
	2	1	char.	blank
	3	4	int.	Number of samples (m)
	4	1	char.	blank
	5	1	int.	Display (0=screen, 1=Hardcopy, 2=HPGL data file)
	6	1	char.	blank
	7	2	int.	Number Header Records (n=4)
	8	1	char.	blank
	9	1	int.	Average type (0=none, 1=weekly, 2=monthly)
	10	1	char.	blank
	11	1	int.	Day of Week for average (1=Monday)
Reporting Period (Start/End)				
2	1	2	int.	start month
	2	2	int.	start day
	3	2	int.	start year
	4	1	char.	blank
	4	2	int.	end month
	5	2	int.	end day
	6	2	int.	end year
Lower Warning Limit				
3	1	11	exp.	alpha limit val. (uCi/cc)
	2	1	char.	blank



Sample Header Data				
	3	11	exp.	beta limit val. (uCi/cc)
	4	1	char.	blank
	5	40	char.	Limit value label
Upper Warning Limit				
4	1	11	exp.	alpha limit val. (uCi/cc)
	2	1	char.	blank
	3	11	exp.	beta limit val. (uCi/cc)
	4	1	char.	blank
	5	40	char.	Limit value label
Header Extension Records				
5,n	1			To be determined

Sample Data Records				
Record	Element	Size (bytes)	Type	Definition
n+1,n+m	1	2	int.	off month
	2	2	int.	off day
	3	2	int.	off year
	4	1	char.	blank
	4	2	int.	off hour (24)
	5	2	int.	off minute
	6	1	char.	blank
	7	6	flt. pt.	Coll. Time (hrs. xxx.xx)
	8	1	char.	blank
	9	1	char.	validation flag ("?"=false)
	10	1	char.	blank
	11	11	exp	alpha result, -x.xxxe-yyy)
	12	1	char.	blank
	13	11	exp.	beta result, -x.xxxe-yyy)

Appendix C: ABCASH Workstation Configuration

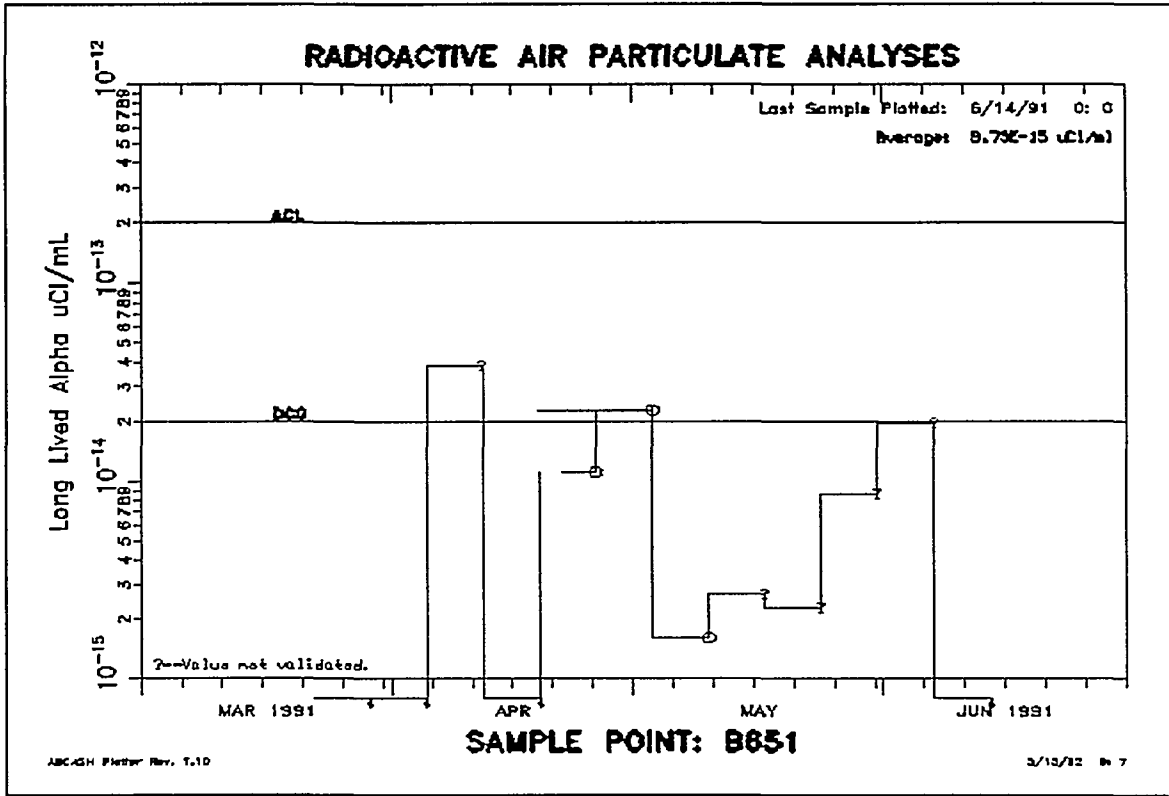
The following defines the recommended full feature ABCASH workstation base configuration.

1. IBM compatible 386 processor or higher
2. 4 MB RAM
3. 80 MB Hard disk (6 Mbyte free)
4. DOS 3.3 or higher
5. QEMM 386
6. VGA Monitor System
7. Hewlett Packard Laserjet as LPT1
8. Paradox 4.0 runtime support for ABCASH

The following defines the recommended support for standalone operation of the plotting program. Performance time is severely impacted on machines lower than 80386.

1. IBM compatible personal computer (8086/8 or 80x86)
2. 512 KB RAM
3. 20 MB Hard disk (3 Mbyte free)
4. DOS 3.1 or higher
5. CGA Monitor System or better
6. Hardcopy printer per supported list
7. Floating Point Unit (Optional)

Appendix D: ABCASH Histogram Chart Example



Appendix E: Diagnostic File Interpretation

The file AIRPLOT.CFG contains a user settable parameter to enable the recording of diagnostic information during the operation of the program. An example of an input data file is shown in Figure 10 and the associated diagnostic file is shown here in Figure 13. The diagnostic file presentation includes line numbers for cross reference to variable names shown below.

Lines 1-16 Copy of input data file, datain.for  
 Lines 17-29 Control definitions from AIRPLOT.CFG, datain.for

Alpha result data

Line 30 Y axis: make\_yax.for  
 label: c\_title  
 scaling factors: a\_ybase, a\_ydelta

Line 31 X axis: make\_xax.for  
 start: istart\_month, istart\_year  
 end: iend\_month, iend\_day, iend\_year  
 days: total\_days (between start and end, inclusive)

Line 32 X axis: make\_xax.for, exit  
 #months: month\_tot, total\_days  
 scaling factors: a\_xbase, a\_xdelta

Line 33 New point absolute calculation: drwcalc.for  
 Time/value: days, seconds, value, x\_pos, y\_pos

Line 34 Release limits: relimits.for  
 value/position: value, x\_pos, y\_pos, limmsg

Line 35-36 See lines 33 and 34  
 Line 37 See line 33  
 Line 38-39 Point position control: drwpoint.for  
 ipoint\_num, idate(3), offtime, value, x\_pos, y\_pos  
 x\_loc, on\_x\_pos, gap, a\_xdelta

Line 40-49 Paired records, 1 for each point, as for lines 38-39

Beta result data

Line 50-60 See lines 30-49

```

Line  Contents.....
 1  W104  11 0 5 2 5
 2  1 592 31692
 3  .20200E-11 .10000E-08 DAC
 4  .20000E-13 .30000E-10 DCG
 5
 6  1 592 1089 288.45      .538E-13      .854E-13
 7  11192 1034 164.25     -.319E-14     .297E-13
 8  11292 919 166.55      .102E-12     .124E-12
 9  11992 1051 169.33     .192E-14     .340E-13
10  12692 11 6 168.67     .106E-12     .192E-12
11  2 292 1127 167.70     .247E-13     .835E-13
12  21692 919 167.50     .251E-12     .374E-12
13  22392 1034 168.83     .444E-14     .707E-13
14  3 292 922 166.92     .116E-14     .171E-13
15  3 992 995 168.92     .102E-12     .306E-12
16  31692 922 166.92     .432E-12     .486E-12
17  Datin summary
18  Alpha min/max: .524282E-13 .202000E-11
19  Beta min/max: .922496E-13 .300000E-10
20  Output Unit      Input/Output Port      Device Model
21  Screen           97) V/EGA 16 Color (640x480) 97) V/EGA 16 Color (640x480)
22  Hardcopy         1) LPT1                  62) HP LaserJet Printer
23  Default process: 0) Normal plotting
24
25
26  Diagnostics to PLTDIAG.SC enabled.
27
28
29  Histogram style plot enabled.
30  Y axis: Long Lived Alpha uCi/mL .100000E-13 .487805
31  Make_xax 1 92 3 31 92 91.0
32  X axis scale: 3 91. .000000E+00 .950549E-01
33  Drwcalc: 4.00000 .000000 .202000E-11 1.38022 5.72597
34  Relimits: .202000E-11 1.38 5.73 DAC
35  Drwcalc: 4.00000 .000000 .200000E-13 1.38022 1.61711
36  Relimits: .200000E-13 1.38 1.62 DCG
37  Drwcalc: 25.4771 41221.4 .524000E-13 3.42172 2.47463
38  Drwpoint: 1 1 26 92 .4771 .524000E-13 3.422 2.475
39  3.422 .0000 -3.422 .9505E-01
40  Drwcalc: 53.3903 33721.9 .931000E-13 6.07501 2.98635
41  Drwpoint: 2 2 23 92 .3903 .931000E-13 6.075 2.986
42  3.422 4.079 .6570 .9505E-01
43  Drwcalc: 75.3903 33721.9 .178000E-12 8.16622 3.56336
44  Drwpoint: 3 3 16 92 .3903 .178000E-12 8.166 3.563
45  6.075 6.175 .9997E-01 .9505E-01
46  Y axis: Long Lived Beta uCi/mL .100000E-13 .650406
47  Make_xax 1 92 3 31 92 91.0
48  X axis scale: 3 91. .000000E+00 .950549E-01
49  Drwcalc: 4.00000 .000000 .100000E-08 1.38022 8.68750
50  Drwcalc: 4.00000 .000000 .300000E-10 1.38022 6.34607
51  Relimits: .300000E-10 1.38 6.35 DCG
52  Drwcalc: 25.4771 41221.4 .922000E-13 3.42172 2.48327
53  Drwpoint: 1 1 26 92 .4771 .922000E-13 3.422 2.483
54  3.422 .0000 -3.422 .9505E-01
55  Drwcalc: 53.3903 33721.9 .176000E-12 6.07501 2.91498
56  Drwpoint: 2 2 23 92 .3903 .176000E-12 6.075 2.915
57  3.422 4.079 .6570 .9505E-01
58  Drwcalc: 75.3903 33721.9 .270000E-12 8.16622 3.20072
59  Drwpoint: 3 3 16 92 .3903 .270000E-12 8.166 3.201
60  6.075 6.175 .9997E-01 .9505E-01

```

Figure 13 Diagnostic File Example

Appendix F: Revision Release Procedure

This plotting program is part of the production ABCASH system. Therefore, the source is maintained with revision and custodial copy control. Revision releases are prepared as follows.

1. Based on documented software change requests and specifications, modify and test the program as necessary.
2. Identify a new revision number X.XX as:  
X. = increment based on major change in appearance or feature.  
.X = increment based on minor change in feature which is generally transparent to user, ie. user controls remain unchanged.  
.XX= increment based on bug fixes to X.X.
3. Update users guide and source documentation as needed. Update revision information in all affected source modules and master listing notebook.
4. Prepare 3 diskette copies of entire development source using the macro "savesrc.bat".
5. Label and forward copies 1 and 2 to central control; retain copy 3 with master listing notebook.